

Listing of Claims

1. (original) A chitosan-calcium (II) complex, comprising: calcium (II) ions bound to a gel of a chitosan salt, wherein said complex contains ≥ 0.5 wt % chitosan having an average molecular weight ≥ 10 kD, a polydispersity ≥ 2.0 , deacetylation degree $\geq 65\%$ and wherein said complex has a water retention value $\geq 300\%$, $\text{pH} \leq 6.9$ and a calcium (II) ion content ≥ 0.1 wt % relative to chitosan.

2. (original) A chitosan-calcium complex according to claim 1, wherein said calcium (II) ions are bound with the chitosan gel by coordinate bonds or hydrogen bonds.

3. (original) A chitosan-calcium (II) complex according to claim 1, wherein said complex is water soluble.

4. (original) A method to produce a chitosan-calcium complex from a gel of a chitosan salt, comprising the steps of:

a) providing a suspension containing ≥ 0.01 wt % chitosan gel, said gel having an average polymerization degree ≥ 10 kD, a polydispersity ≥ 2.0 , and deacetylation degree $\geq 65\%$; and

b) mixing said chitosan gel with ≥ 0.01 wt % calcium (II) salt to form said complex; wherein said complex has a water retention value $\geq 300\%$ and a $\text{pH} \leq 6.9$.

5. (original) A method according to claim 4, wherein said calcium (II) salt is selected from the group consisting of calcium chloride and calcium acetate.

6. (original) A method according to claim 5, wherein said calcium (B) salt concentration is 10-50 wt % relative to chitosan.

7. (original) A method according to claim 4, wherein said mixing step is carried out at a temperature $\geq 10^\circ \text{C}$.

8. (original) A method according to claim 7, wherein said mixing step is carried out at a temperature between 20° C and 40° C.
9. (original) A chitosan-calcium (II) complex prepared according to the method of claim 4.
10. (original) A method of preparing chitosan salt gels, comprising the steps of:
- a) degrading chitosan in an aqueous acidic solution with enzymes, said solution having a chitosan concentration of ≥ 0.5 wt % for a desired time and at a desired temperature;
 - b) deactivating said enzymes after said desired time is completed;
 - c) adding an aqueous basic solution to said enzyme/aqueous chitosan mixture to attain $4.0 \leq \text{pH} \leq 6.0$; and
 - d) continuously mixing said mixture until a gel of a chitosan salt forms.
11. (original) A method according to claim 10, wherein said gel forms at $6.3 \leq \text{pH} \leq 6.9$.
12. (original) A method according to claim 10, wherein said aqueous acidic solution comprises an acid selected from the group consisting of hydrochloric acid, acetic acid and lactic acid.
13. (original) A method according to claim 10, wherein said enzymes are selected from the group consisting of chitinases, cellulases and xylanases.
14. (original) A method according to claim 10, wherein said aqueous basic solution comprises a member selected from the group consisting of sodium hydroxide, potassium hydroxide, sodium carbonate and potassium carbonate.
15. (original) A method according to claim 10, wherein the concentration of chitosan in said aqueous acidic solution is between about 1 wt % and 3 wt %.

16. (original) A method according to claim 10, wherein said degrading step is carried out at a temperature $\geq 10^{\circ}\text{C}$.

17. (original) A method according to claim 10, wherein said degrading step is carried out at a temperature between about 20°C and 60°C .

18. (original) A method according to claim 10, wherein said deactivating step is carried out at a temperature $\geq 70^{\circ}\text{C}$.

19. (original) A method according to claim 10, wherein said aqueous basic solution has a concentration of between about 5 wt % and 10 wt %.

20. (original) A method according to claim 10, wherein said method is a batch process.

21. (original) A method of preparing a gel of a chitosan salt, comprising the steps of:
a) degrading chitosan hydrolytically, said chitosan being dissolved in an aqueous acidic solution, said solution having a chitosan concentration of $\geq 0.5\text{ wt \%}$ for a desired time and at a desired temperature;

b) adding an aqueous basic solution to the mixture of step a) to attain $4.0 \leq \text{pH} \leq 6.0$; and

c) continuously mixing the product of step b) until a gel of a chitosan salt forms.

22. (original) A method according to claim 21, wherein said step a) utilizes an acid selected from the group consisting of hydrochloric acid and chloroacetic acid.

23. (original) A method according to claim 22, wherein the concentration of said acid used is at least 0.01 wt %.

24. (original) A method according to claim 21, wherein step a) is carried out at a temperature of $\geq 20^{\circ}\text{C}$.

25. (original) A method according to claim 24, wherein said temperature is between 40° C and 80° C.

26. (original) A method according to claim 21, wherein said aqueous acidic solution comprises hydrochloric acid, acetic acid or lactic acid.

27. (original) A method according to claim 24, wherein said aqueous acidic solution has a chitosan concentration of between 1 wt % and 3 wt %.

28. (original) A method according to claim 21, wherein said aqueous basic solution comprises a base selected from the group consisting of sodium hydroxide, potassium hydroxide, sodium carbonate and potassium carbonate.

29. (original) A method according to claim 28, wherein said aqueous basic solution has a concentration of 5 wt % to 10 wt %.

30. (original) A method according to claim 21, wherein said gel forms at $6.3 \leq \text{pH} \leq 6.9$.

31. (original) A method according to claim 21, wherein said method is a batch process.

32. (original) A method according to claim 21, wherein said chitosan concentration in said aqueous acidic solution is between 1 wt % and 3 wt %.

33. (original) A method of preparing a chitosan salt gel, comprising the steps of:
a) degrading chitosan with an oxidizing agent, said chitosan being dissolved in an aqueous acidic solution, said solution having a chitosan concentration of ≥ 0.5 wt % for a desired time and at a desired temperature;
b) adding an aqueous basic solution to the mixture of step a) to attain $4.0 \leq \text{pH} \leq 6.0$; and

c) continuously mixing the product of step b) until a gel of a chitosan salt forms.

34. (original) A method according to claim 33, wherein said oxidizing agent is selected from the group consisting of hydrogen peroxide and sodium perborate.

35. (original) A method according to claim 33, wherein said aqueous acidic solution comprises a member of the group consisting of hydrochloric acid, acetic acid and lactic acid.

36. (original) A method according to claim 33, wherein said concentration of chitosan is between 1 wt % and 3 wt %.

37. (original) A method according to claim 33, wherein the concentration of said oxidizing agent is ≥ 0.001 wt %.

38. (original) A method according to claim 37, wherein the concentration of said oxidizing agent is between 0.01 and 0.5 wt %.

39. (original) A method according to claim 33, wherein said aqueous basic solution comprises a member selected from the group consisting of sodium hydroxide, potassium hydroxide, sodium carbonate and potassium carbonate.

40. (original) A method according to claim 39, wherein said aqueous basic solution has a concentration of between 5 wt % and 10 wt %.

41. (original) A method according to claim 33, wherein said gel forms at $6.3 \leq \text{pH} \leq 6.9$.

42. (original) A method according to claim 33, wherein said method is a batch process.